CLAIMS:

1. An LED area illumination source for emitting light of a desired color comprising:

a) a plurality of individual groups of LEDs with each group representing a finite area of the source and capable of replicating all of the colors of the source;

b) each individual group including a plurality of LEDs with the LED(s) representing a discrete color being arranged to be separately energized so that by simultaneously energizing one or more of the LEDs a desired color and luminous intensity of light can be emitted from the group; and

c) at least one light sensor capable of providing a separate output signal representative of a measure of the luminous intensity of the emitted light from each LED.

2. The illumination source of claim 1 wherein said at least one light sensor comprises a single light sensor associated with all of the LEDs in an individual group.

3. The illumination source of claim 1 wherein said at least one light sensor comprises a light sensor associated with each LED.

4. The invention of claim 1 wherein the illumination source is a display arranged to form an image to be viewed by an observer or observers and each individual group of LEDs is capable of representing the smallest perceived increment of the displayed image.

5. A method of determining the degradation of the LED(s) representative of each color of the illumination source of claims 1, 2, or 3 comprising:

a) energizing the LEDs at time t_o to provide a separate light sensor output signal for each LED(s) representative of a discrete color for each group with each signal bearing a predetermined relationship to the energization level of the respective LED(s); and

b) at a subsequent time t_n energizing the LEDs to provide a separate output signal for each LED(s) representative of a discrete color of each group with the output signals bearing a predetermined relationship to the energization level of the respective LED(s);

c) reading each output signal obtained during the energization at time t_n; and

d) comparing the sensor output signals associated with each LED(s) representing a discrete color of each group obtained at t_n with the corresponding output signals obtained at t_o.

6. The method of claim 5 wherein the energization levels at times t_o and t_n are set at given percentages of the total available energization.

7. The method of claim 6 wherein the energization level is the maximum.

8. The method of claim 5 wherein PWM is used to energize the LEDs with 100% ON TIME being the maximum.

9. The method of claim 5 wherein the illumination source is a video display for forming an image to be viewed by an observer or observers and further including characterizing the display at time t_o by varying the energization of each LED(s) representing a discrete color of each group to achieve the desired light output for the display, the light sensor output signals stored at t_o further bearing a predetermined relationship to the light emitted by the respective LED(s) and subsequent to the comparison step controlling the energization of each LED(s) representative of a discrete color for each LED group to substantially restore the desired light output achieved at time t_o and storing a signal representative of the energization levels required to restore the desired light output.

10. The method of claim 9 further including at time t_n measuring the difference between the sensor output signals at time t_n with corresponding output signals at time t_o to provide an error signal representative of the difference.

11. The method of claim 10 further including reducing the error signals to an acceptable amount.

12. The method of claim 11 further including storing the energization signal for each LED(s) representing a discrete color for each pixel unit required to reduce the error signal to the acceptable amount for subsequent use.

13. The method of claim 10 further including comparing the error signal with a predetermined maximum value representing an LED or detector failure and storing a failure signal identifying the LED or pixel group.

14. A colored video display for directing light forming an image in an XY plane to be viewed by an observer or observers comprising:

a) a plurality of individual pixels with each pixel being capable of representing the smallest increment or perceived point of the image;

b) each pixel comprising a plurality of LEDs, the LEDs representing each primary color being arranged to be separately energized so that by simultaneously energizing one or more of the LEDs of a pixel any desired color can be emitted from the pixel; and

c) at least one a light sensor mounted within the display for providing a separate output representing a measure of light emitted by each primary color LED within each pixel.

15. The display of claim 14 wherein said ate least one light sensor comprises a light sensor associated with each pixel.

16. The display of claim 14 wherein said at least one light sensor comprises a light sensor individually associated with each LED.

17. A method of operating the video display of claim 14 comprising:

a) characterizing the display at time t_o by sequentially energizing each primary color LED(s) of each pixel to achieve the desired output for the display and storing the energization level for each LED necessary to achieve the desired output at the time of characterization;

b) at the time t_o of characterization reading and storing the outputs of said at least one light sensor so that the outputs associated with the primary color LED(s) bears a predetermined relationship with the light emitted from and the energization of the associated LED(s)

c) at a time t_n subsequent to characterization separately energizing each primary LED(s) of each pixel with a predetermined level of energization; and

d) comparing the corresponding sensor outputs obtained at times t_o and t_1.

18. The method of claim 17 further including controlling the energization of each primary color LED(s) of each pixel to restore the luminous intensity of each primary color LED(s) to the value achieved at t_o.

19. A colored video display for directing light forming an image to be observed by an observer or observers comprising:

a) an array of pixels with each pixel capable of representing a perceived point of the displayed image;

b) each pixel comprised of a plurality of LEDs, the LED(s) representing a discrete color being arranged to be separately energized so that by energizing one or more of the LEDs any desired color can be emitted from the pixel;

c) the display being arranged to internally reflect a portion of the light emitted from each LED; and

d) at least one light sensor arranged to receive a portion of the internally reflected light from each LED.

20. The video display of claim 19 wherein said at least one light sensor comprises a light sensor associated with each LED.

21. The video display of claim 19 wherein said at least one light sensor comprises a single light sensor associated with each pixel.

22. A method of calibrating the display of claim 19 comprising:

a) at time t_o energizing the LEDs to achieve the desired light output and further energizing each LED(s) of each pixel representing each discrete color and reading a measure of light emitted by each of said LEDs with the measurement bearing a predetermined relationship to the intensity of the emitted light and the energization level of the respective LED(s);

b) at time t_n, subsequent to t_o, energizing each LED(s) representing a discrete color of each pixel and measuring the light output of each of said LED(s) with the measurement bearing a predetermined relationship to the energization level of said LED(s);

c) comparing the measurement of light output of each LED(s) representing a discrete color of each pixel at t_n with the corresponding measurement of the light output at t_o; and

d) controlling the energization of each LED(s) representing a discrete color of each group to substantially restore said desired output achieved at time t_o.

23. A method of operating the display as characterized in claim 22 further including the step of measuring the output of said at least one light sensor associated with each LED(s) representing a discrete color of each pixel while the display is forming the image to provide a snap shot of the displayed image.

24. A method of operating the display of claim 22 wherein said at least one light sensor is arranged to provide an output on a pixel by pixel basis representative of the ambient light falling on the display.